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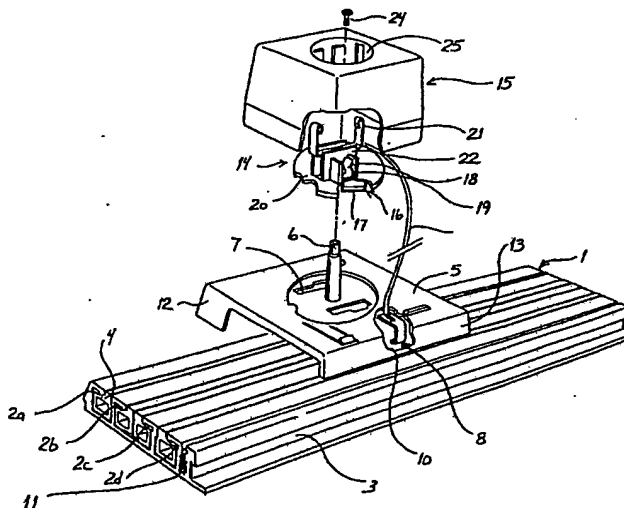
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(54) Title: VOLTAGE RAIL



(57) Abstract

A voltage rail (1) comprises an insulated back wall, and a front wall spaced in a distance from said back wall, and a number of conducting paths (2a, 2b, 2c, 2d, 3) which at least in part are situated in parallel longitudinal extending cavities between the back and the front wall. An adapter (14) for use with this voltage rail (1) comprises contact elements (16) connected to a mount which is rotatable relative to the rail (1), so that contact elements (16) can be brought located in the cavities for the paths (2a, 2c) of the rail in a first position where they are not in contact with the paths (2a, 2c). This mount is adapted to be rotated to a second position where the contact elements (17) come in contact with the paths (2a, 2c). A packing body (4) is located in the cavity and has an outer shape corresponding to the profile of the cavity. The packing body is able to move away from the contact elements (17) when these are introduced into the cavity and caused to move into position in contact with the paths (2a, 2c). The adapter (14) may be connected to a cable (32) and equipped with an isolating house (15) for forming a plug (31).

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### Voltage rail

The present invention relates to a voltage rail, as stated in the introductory part of claim 1.

A voltage rail is used for conducting electrical current around a house, office, etc.

- 5 A number of conducting paths are situated entirely or partly hidden in the voltage rail. The paths can be arranged for distribution of both net voltage and signaling, such as telephone, broadcasting, alarm etc. The conducting paths should normally not be accesible for safety reasons. However, it should be possible to connect new equipment and move existing equipment.
- 10 DE 2 722 880 discloses a device in which contact with a voltage rail is made using contact pins which brought into direct contact with t he conducting paths of the rail. An adapter has projecting contact elements, and a spring mechanism urges these against the paths when the adapter is mounted to the rail . The paths have an isolated exterior section, in which are located comparatively small orifices for the contact
- 15 elements. This construction is meant to avoid anyone making accidental contact with the conducting paths. A disadvantage with this construction is that there are very small tolerances for the contact elements. If the contact elements of the adapter are bent, later installation is more difficult.

- SE 366 434 discloses a device wherein the contact elements of an adapter are
- 20 pressed out after being mounted in a voltage rail, where the conducting paths are situated in two opposite sides. Also this rail presents a significant safety risk, as it is relatively simple to gain access to the conducting paths. The paths are furthermore open to corrosion, as there are directly exposed to the air all the time. Corroded paths results in a great effect loss.

- 25 SE 366 169 discloses a rail in which the path of a ground potential is situated against the wall with which the rail is mounted and two conducting paths are situated at a distance from, and parallel to the ground path. An adapter for connection to this rail comprises a projecting member having a spring loaded contact element in the middle, for ground contact, and two contact elements at its ends, for respective
- 30 conducting paths.

The adapter is introduced between the conducting paths and pressed against the ground path, while being rotated 45°. As the conducting paths are situated behind a

rim, the member with the contact elements must be pressed in beyond this rim before being released whereupon the contact elements come in clamping contact with the conducting paths. Such device has the disadvantage that a comparatively wide part of the voltage rail must be open for introduction of the contact element. The rim  
5 makes installation difficult and as the contact elements need to be pressed in and released this can result in a weak contact. It is also too simple to gain access to the conducting paths.

NO 147894, DE 3048828 and SE 380146 all disclose voltage rails having adapters which should be rotated 90° radially against the conducting paths to bring the contact  
10 elements into contact with the paths. As with other rails the paths are also easily accessible. For restricted access to the part of the path that is not used for connection of equipment it should be covered by plastic covers which are pressed in place. However, this means that this system is not readily adaptable as new plastic covers need to be cut if some equipment is moved or new equipment is installed. It is  
15 therefore an object of the present invention to provide a device of the above mentioned kind without the disadvantages of the prior art.

The object of the invention is achieved with a device having features as stated in the characterizing part of claim 1. Further features will be clear from the dependent claims.

20 In the following, the invention will be described using examples of embodiments, and with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of an embodiment of a voltage rail having an adapter according to present invention,

Fig. 2a - 2b show different steps in the installation of an adapter for pulling  
25 current from the voltage rail,

Fig. 3a - 3g show sections of different embodiments of a rail according to the present invention,

Fig. 4a - 4f show sections of different embodiments of a packing body for the channels of the rail according to present invention,

30 Fig. 5 shows a plug for use in connection with present invention, and  
Fig. 6 shows the plug from Fig. 5 during installation.

- Referring first to Fig. 1 a voltage rail 1 is shown, which can be installed with a wall, in the roof, etc. The voltage rail 1 has conducting paths 2a, 2b, 2c and 2d, which are situated parallel to the surface on which the voltage rail 1 is installed said paths having open surfaces in against the voltage rail. Cavities or channels are
- 5 formed between the conducting paths 2a - 2d and the back wall of the voltage rail. Further there is a path 3 which has ground potential situated next to the voltage rail. Signaling paths 11 are, in this example, situated in the voltage rail between the conducting paths 2a - 2d and the ground path 3. Preferably the circuits of the conducting paths are mixed, so that paths 2a and 2c form one circuit, and 2b and 2d
- 10 form another circuit. In the cavity formed between the conducting paths and the back wall of the voltage rail is located a packing body, or "hose" 4 made from a flexible and insulating material, such as rubber, for filling the cavity. This gives the advantage that it is more difficult to accidentally gain access to the conducting paths, and it is also protects against corrosion.
- 15 To enable a user to gain access to the conducting paths 2a - 2d, 3a, special adapter is used. Fig. 1 shows an adapter for an outlet; objects can of course also be connected directly to the rail. For example, it is easy to consider an electric heater or other stationary equipment, which can be connected directly to the rail without an interconnecting cable.
- 20 The adapter comprises a mounting plate 5, which is equipped with lips 12, 13 adapted to make total contact against the voltage rail 1. Furthermore, most adapters of this kind will have a contact 8 for the ground potential path 3 such as a lip 10 to contact against path 3 and a cable 9 or similar providing contact with the ground outlet of the equipment in question, in this case the electric outlet. The mounting
- 25 plate 5 is also equiped with grooves 7 for the net voltage contacts 17 and an upward extending post 6 which functions as a guide for a rotating plate 20 and a electric outlet cover 15.
- An "operative" part 14 of the electric outlet comprises contact elements 16, which have a lower end 17 adapted for making contact against one of the paths 2a - 2d, and
- 30 an upper end 18 constructed as an "U", having a tapered section to form a strong contact against the protruding plug contacts. The upper end 18 is contained in an isolated cover 19 which is cast fixed to the isolating rotating plate 20 of the electric

outlet. Ground potential is taken to ground clamps 21 through a cable 9 which is connected to the ground contact 8.

The cover 15 for the electric outlet contains a cavity 25 having two orifices for the protruding plug contacts. The cover 15 is fixed by a screw 24 in the center of the  
5 post 6 of the mounting plate 5.

Figs. 2a - 2b, show different steps during installation of the plug.

First, the contacts 16 are situated with their downward extending parts 17 into two conducting paths 2a, 2c. The flexible packing body 4 will bend away. The plug is rotated anti clockwise, to the position shown in Fig. 2b. Here the contact element, or  
10 lips 17 are in place and form contact against the conducting paths 2a, 2c. Contacts 17 are thus brought into contact with the conducting paths 2a, 2c, in an axial direction.

By further referring to Figs. 3a-g, different variations of voltage rails 1 according to present invention are disclosed. The conducting paths 2a - 2d and the ground path  
15 3 can be situated in different ways in the rail 1. Also, the ground path 3 can be situated in its own channel. Signaling paths 11 are best located on one side of the rail, but they can also be situated differently.

Fig. 3a shows a voltage rail 1 having one cavity for all of the conducting paths 2a - 2d. The ground path 3 is separate.

20 Figs. 3b - 3e show voltage rails with two cavities for conducting paths 2a - 2d. In Fig. 3e and 3d the ground path 3 is situated in the bottom of the voltage rail 1. In Fig. 3d and 3e, the conducting paths 2a - 2d are situated in the side walls of the channels. Fig. 3f and 3g show variations where the conducting paths are situated in three channels, and where Fig. 3g comprises three circuits.

25 In Fig. 4a - 4f different variations of packing bodies 4 are shown. The packing body should have a profile corresponding to the form of the cavity with the conducting paths 2a - 2d. In Fig. 4a - 4f there are shown variations of packing bodies which fit to voltage rail 1 of Fig. 1, but it should be understood that different profiles can be used for different variations of the voltage rail.

30 The packing bodies 4 have the task of making the cavities with the conducting path 2a - 2d tight while at the same time permitting access of the contact elements 16 to the conducting paths 2a - 2d. A person skilled in the art will realise which material

can be used to achieve these objects. Herein are shown some variations of technical and aesthetic solutions.

Fig. 4a and 4b show packing bodies 4 of a relatively rigid flexible plastics material, and where the packing body 4 in Fig. 4a is open in against the rail 1, while in Fig. 4b it is a closed tube. Furthermore, the body 4 in Fig. 4a has an extension 26 on one of the side walls, to assist in the holding of the packing body in the cavity of the rail 1 shown in Fig. 1.

Fig. 4c shows a packing body 4 having a section 27 which extends diagonally to a base section 28. This arrangement will be resilient.

10 Fig. 4d shows a compact packing body 4 of rubber or syntetic materials having the necessary properties.

Fig. 4e and 4f shows the packing body 4 with resilient elements, where Fig. 4e has a separate helical spring 29, and Fig. 4f has a zig-zag spring, which can be cast in one piece with the packing body 4.

15 Although the example shows connections of an electrical outlet, different equipment can of course also be connected. It is possible to connect a plug directly, as shown in Fig. 5. The plug 31 is constructed so that the "operative" part 14 of the adapter is connected to the cable 32 and situated in an isolating house 15. The mounting plate 5 is rotatably connected to the house 15 by the screw 24 being  
20 screwed in the guiding post 6. On the operative part 14 are situated two sleeves 33. In the house 15 are situated two columns (not shown), which fit in the sleeves 33. The columns may thereby assist the transfer of an applied torque from the house 15 to the operative part 14 with contact elements 16. The conductors are fixed directly to the contact elements 16, which tongues 17 fits in track 7 of the mounting plate 5.  
25 The mounting plate 5 is furthermore equipped with ribs 34 on the lower side.

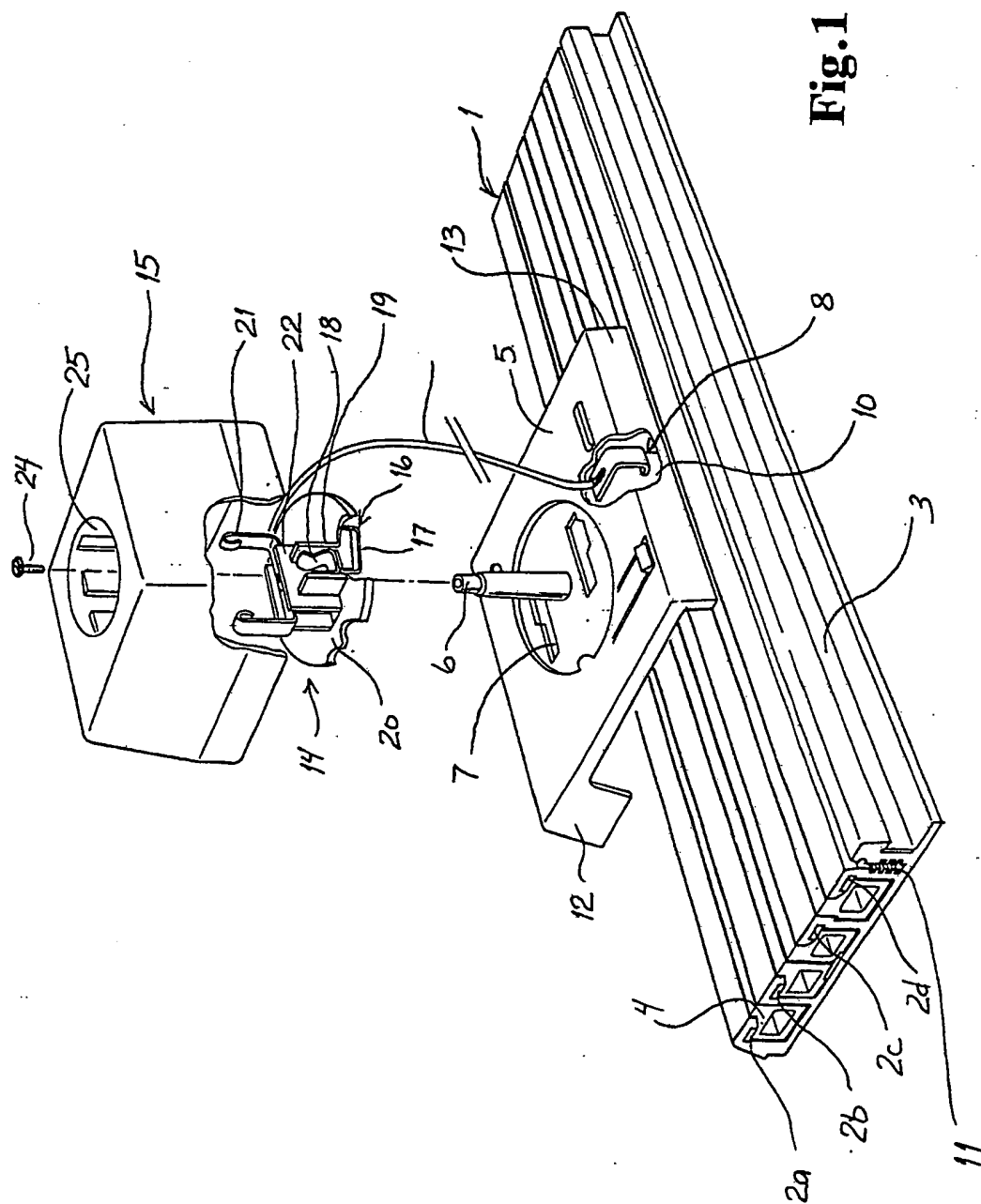
Installation of the plug 31 is shown in Fig. 6. The contacts 17 are pressed in place against two conducting paths 2a, 2c, so that the packing bodies 4 give in. The mounting plate 5 is held against the rail 1 using ribs 34 which fit in the tracks in the grooves of the rail. The house 15 with the operative part 14 is rotated as shown with  
30 the arrow, and contact is achieved. The advantage of this embodiment is that the plug can be connected anywhere along the rail and it is not necessary to use stationary electrical outlets.

## Claims

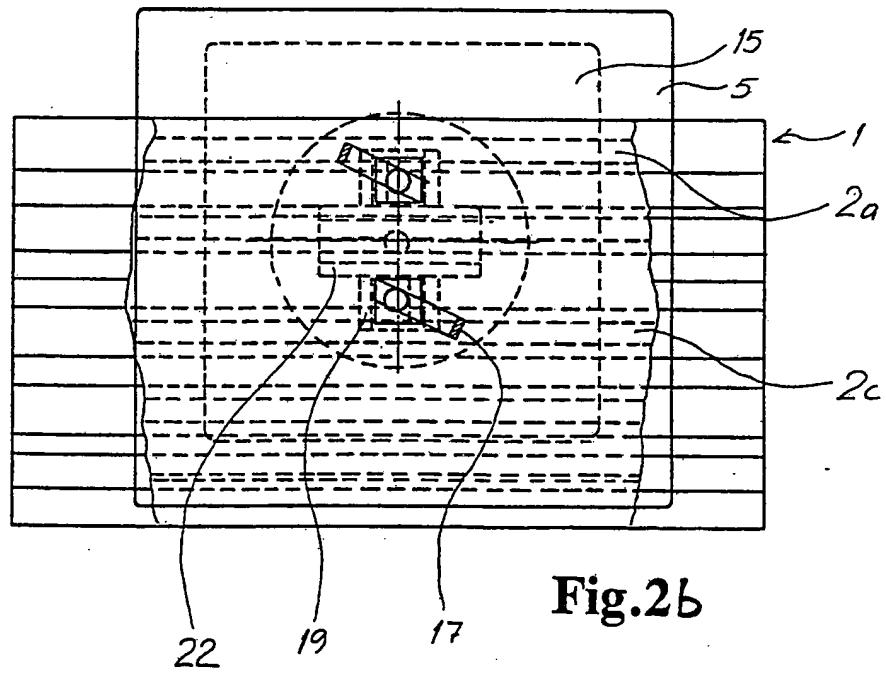
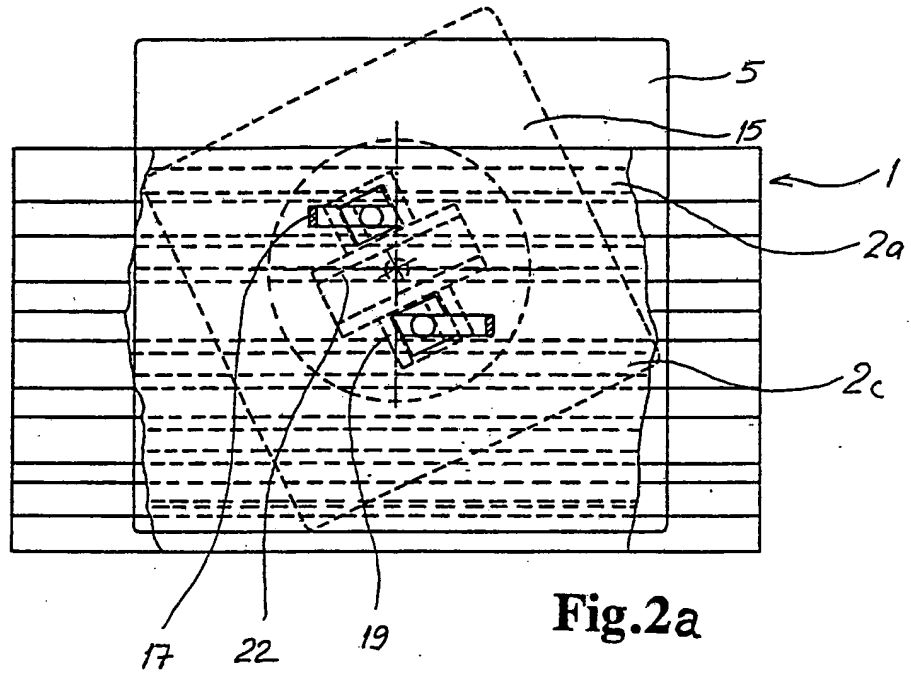
1. Voltage rail (1) comprising an insulated back wall, and a front wall spaced a distance from said back wall, and a number of conducting paths (2a, 2b, 2c, 2d, 3) which at least in part are situated in parallel longitudinal extending cavities between the back and the front wall, wherein an adapter (14) can be engaged with the voltage  
5 rail, said adapter comprising contact elements (16) connected to a mount which is rotatable relative to the rail (1), the contact elements (16) being locatable in the cavities for the paths (2a, 2c) of the rail in a first position where they are not in contact with the paths (2a, 2c), but upon the mount being rotated to a second position, the contact elements (17) come into contact with the paths (2a, 2c),  
10 characterized by a packing body (4) being located in the cavity, said packing body having an outer shape corresponding to the profile of the cavity, but able to move away from the contact elements (17) when these are introduced into the cavity and caused to move into contact with the paths (2a, 2c).
2. Device according to claim 1,  
15 characterized by the conducting paths (2a - 2b) being fixed to the front wall with their accessible side in against the back wall.
3. Device according to claim 1,  
characterized by the conducting paths (2a - 2d) being fixed to the side walls with having their accessible side in against the opposite side wall.
- 20 4. Device according to any one of claims 1 - 3,  
characterized by the mount with the contact elements (17) being adapted to be rotated against the conducting path in an axial direction.
5. Device according to any one of claims 1 - 4,  
characterized by the packing body (4) being from a flexible material.
- 25 6. Device according to any one of claims 1 - 5,  
characterized by the packing body (4) having at least in part is hollow.
7. Device according to any one of claims 1 - 6,  
characterized by the packing body (4) being equipped with a resilient element (28, 29, 30).



8. Device according to anyone of claims 1 - 7,  
c h a r a c t e r i z e d b y the contact element (16) comprises a lip (17) having an  
U-shape with one leg adapted to make contact with one of the conducting paths  
(2a - 2d, 3).
- 5 9. Device according to anyone of to claims 1 - 8,  
c h a r a c t e r i z e d b y there being no rim between the conducting paths (2a -  
2d, 3), hindering rotation of the contact elements (17).
- 10 10. Device according to anyone of claims 1 - 9,  
c h a r a c t e r i z e d b y a path (3) of the rail having a ground potential, and a  
cover (5) is removably mounted to the rail (1), which cover is equipped with contact  
elements (8) for the ground path (3).
11. Device according to anyone of claims 1 - 10,  
c h a r a c t e r i z e d b y the adapter (14) being connected to a cable (32) and  
equipped with an isolating house (15) for forming a plug (31).



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**SUBSTITUTE SHEET**

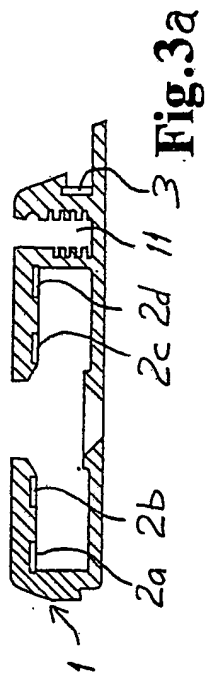


Fig. 3a

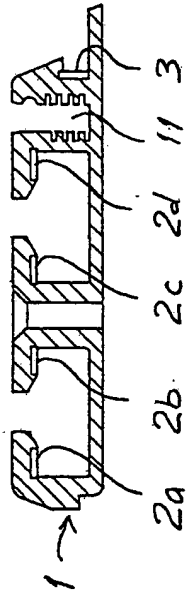


Fig. 3b

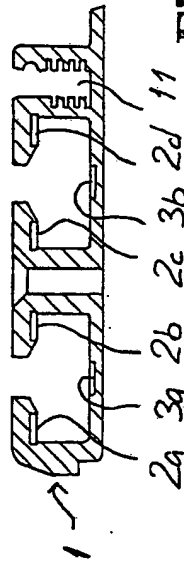


Fig. 3c

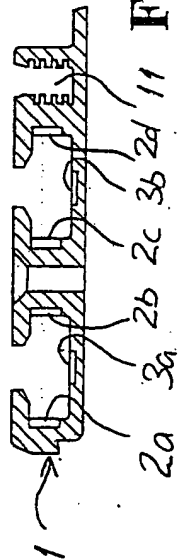


Fig. 3d

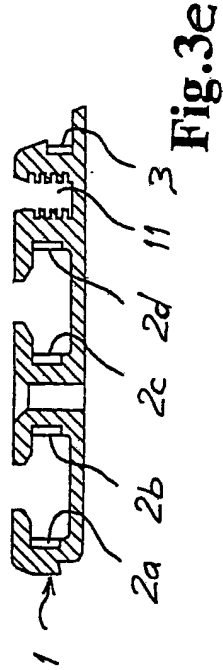


Fig. 3e

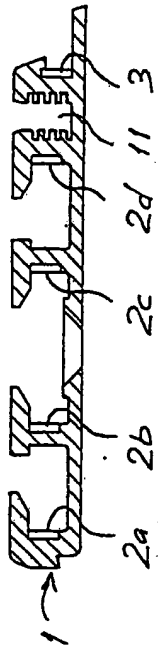


Fig. 3f

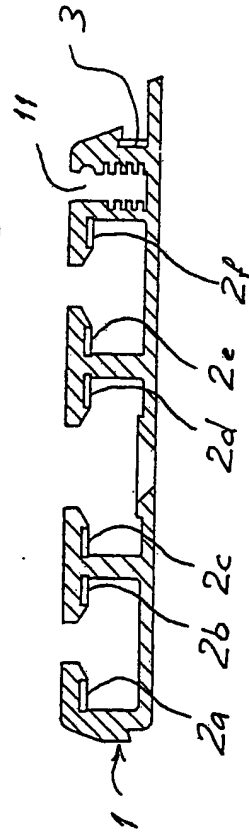
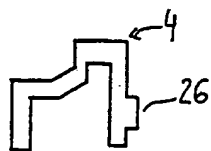
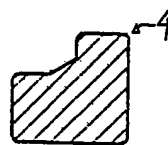


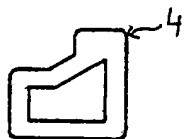
Fig. 3g



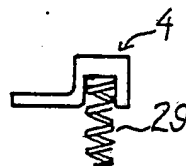
**Fig. 4a**



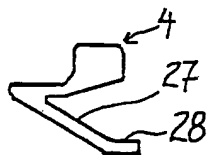
**Fig. 4d**



**Fig. 4b**



**Fig. 4e**



**Fig. 4c**



**Fig. 4f**

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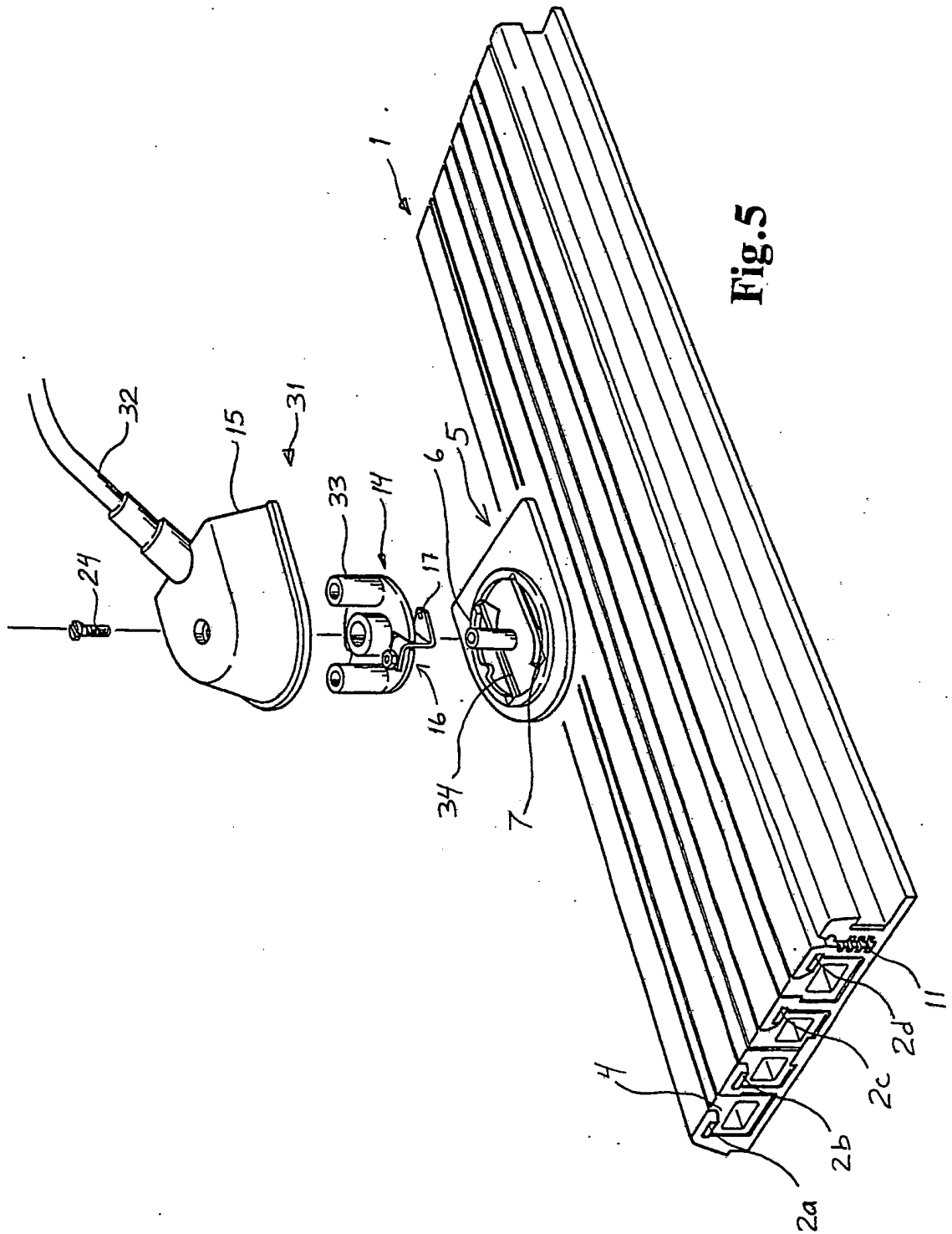


Fig. 5

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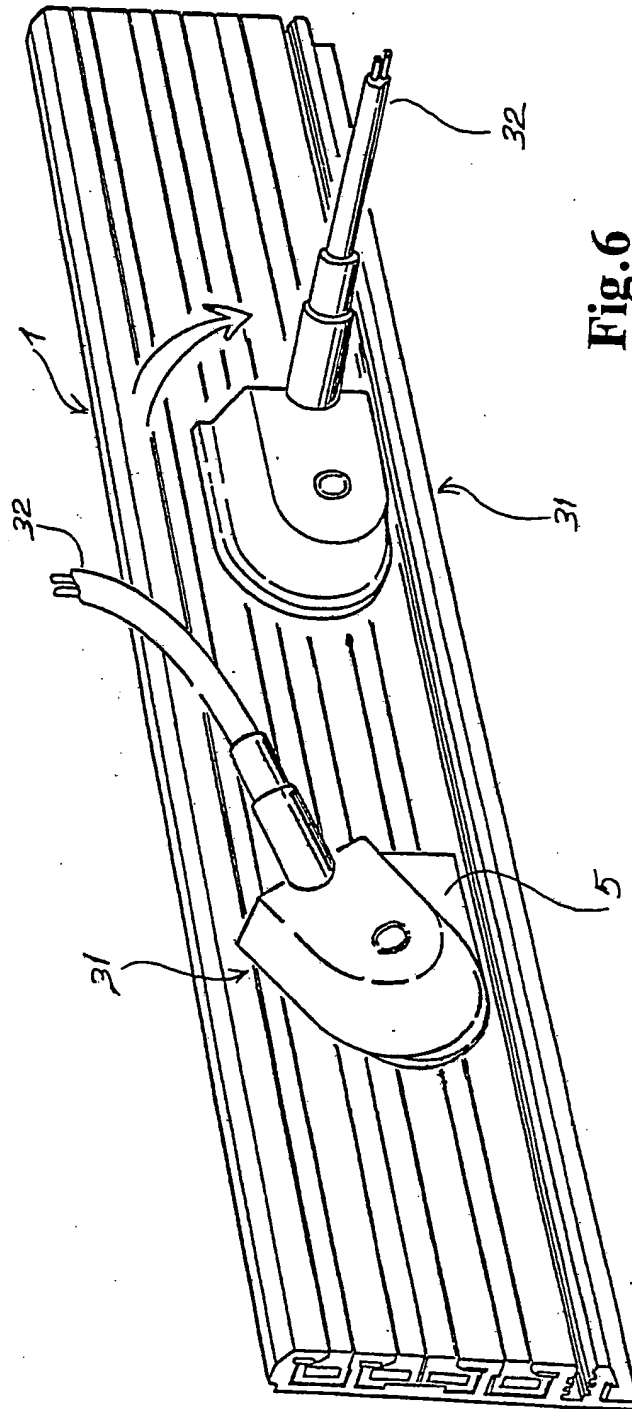


Fig. 6

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 93/00044

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: H02G 5/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: H01R, H02G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 2117773 (ALFRED A. STEINMETZ), 17 May 1938 (17.05.38), figure 2  -----	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 2117773	17/05/38	NONE	